

Research needs for developing innovative alternatives to antibiotics discussed at Bangkok workshop, 19 December 2019

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The global increase in the level of antibiotic resistance among bacterial pathogens is believed to be due to the over and misuse of antibiotics in human and animal health. Following the 3rd International Symposium on Alternatives To Antibiotics (ATA), which was held in Bangkok on the 16 – 18 December 2019, STAR-IDAZ International Research Consortium organised a workshop to identify the critical knowledge gaps needing to be addressed to deliver a range of possible alternatives.

The key objectives of the ATA symposium were to highlight promising research results and novel technologies that provide alternatives to antibiotics for use in animal health and production, assess challenges associated with their commercialisation and use and provide actionable strategies to support their development. The symposium focused on five product categories that could reduce the use of medically important antibiotics in animal health and production: 1) vaccines; 2) microbial derived products; 3) phytochemicals; 4) immune-derived products; and 5) innovative drugs, chemicals and enzymes. Alternatives to antibiotics were broadly defined as any substance that can be substituted for therapeutic drugs that are increasingly becoming ineffective against pathogenic bacteria, viruses or parasites. The topics of the keynote presentations and research papers focused on the development of innovative products for the prevention and treatment of diseases, as well as the enhancement of animal production that do not result in the creation of selection pressure favouring the development of resistance.

The research gap analysis workshop brought together a number of key contributors to the symposium and invited participants to start off the process of developing a global

research agenda for the development of alternatives to antibiotics by exploring experts' views on research priorities. The aim of the workshop was to identify research gaps relating to non-antibiotic-based products and approaches for controlling infections and enhancing livestock productivity while maximising the life of the therapeutics. Some of the workshop participants had been invited to participate electronically in a questionnaire survey prior to the Bangkok meeting and this formed the basis for the workshop discussion of the knowledge gaps. The workshop participants were first invited to comment on a draft overarching logical framework defining the area focusing on the goal, purpose, outputs and activities. The overall goal is to develop alternatives to antibiotics and to reduce/rationalise the use of medically important antimicrobials in livestock so as to safeguard their effectiveness, decreasing the level and the development of resistance to antibiotics in livestock, while maintaining/enhancing production levels, and controlling the occurrence of disease.

A number of possible approaches targeting either the pathogen or the host or both were considered while the basis by which antibiotics promote enhanced growth also needs to be investigated. The workshop focused on phage technology, immunomodulators, the microbiome and how it might be manipulated and how antibiotics promoted growth. Vaccines and chemotherapeutics (including phytochemicals and antimicrobial peptides) were not considered as these are covered by the vaccine and therapeutics development research roadmaps respectively. For each of the key areas discussed what we are trying to achieve was agreed in outline terms which, for specific products, will be refined later as target product profiles. Working back from these targets the challenges in delivering them were discussed and the possible solution routes and their dependencies were identified. Further rounds of consultation will be conducted electronically with an enlarged Working Group which will then be brought together for a face-to-face meeting to validate the research agenda(s). Overall, the workshop constituted an important step towards the development of new non antibiotic-based antimicrobial products and approaches for controlling infections and enhancing productivity, while maximizing the life of existing and new therapeutics through international collaboration and improved focus of the research effort.